New Sisyphe features for v6p1 links from New version features

v6p1 Sisyphe
New features of SISYPHE v6.1
The main new features of this version 6.1 are :

An improved mass conservative scheme for the treatment of boundary conditions (Dirichlet conditions) for the suspension. → the non-conservative treatment has been preserved and the new conservative option is turned on by use of keyword: TREATMENT OF FLUXES AT THE BOUNDARY =2. This development involved changes in the time loop in both Telemac-2d and –3d model (call to Sisyphe). There remains some problems with the BC for the concentrations (becoming infinite) in the corner node when the boundary is not rectangular ?

The porosity coefficients XKV =(1/1-n) is no longer used and replaced everywhere in the code by the concentration of the non-cohesive sediment bed (1-n), where n is the non-cohesive bed porosity (given by new keyword: NON COHESIVE BED POROSITY). This involves changes in all the bedload treatment and improvement of the time loop.

The Sisyphe bed friction predictor for total bed roughness can now be fed back and used in the Telemac-2d calculation. BUT beware that the friction law has to be set to 5 in TELEMAC (Nikuradse) if you want to use this option of SISYPHE. This needs to be more user friendly to avoid abusive use.

Important notice:

In internal coupling the call to Sisyphe is now at the end of the time loop of Telemac-2D. This was done to ensure a perfect mass conservation of suspended sediment, which requires data on the continuity equation, that are still unknown when the computation starts.

New or modified key-words :

NON COHESIVE BED POROSITY

- Default value = 0.4

- Replaces the COEFFICIENT FUNCTION OF POROSITY

- In the future, this could become an array and defined as a function of sand diameter

NUMBER OF BED LOAD MODEL LAYERS

- DEFAULT : (V6p0: NOMBLAY = 2 , V6p1: NOMBLAY =1)

- This should be merged in the future with the NUMBER OF LAYERS OF THE CONSOLIDATION MODEL

COEFFICIENT FUNCTION OF THE POROSITY is replaced by keyword: **NON COHESIVE BED POROSITY (POROSITE DU LIT NON COHESIF)**. The previous keyword was meant for 1/(1-XKV) where XKV was the porosity. Now XKV is asked directly. For example if the previous value was 1.6, the new one will be 0.375.

VARIABLES FOR GRAPHIC PRINTOUTS The additional variables can now also be included:

KS (total bed roughness)

MU (correction for skin friction)

TOB = Total bed shear stress

D50 (Mean grain diameter)

REFERENCE CONCENTRATION FORMULA

- ICR=3 for the Van Rijn formula (in addition to ICR = 1 for the Zyserman and Fredsoe formula, and ICR =2 for Bijker). See details below

Van Rijn (2007) Reference formula (suspension_VanRijn.f) :

The concentration is defined at Zref = max (½ ks, 0.01m)

BED ROUGHNESS PREDICTION (KSPRED, logical)

- DEFAULT value : KSPRED = NO

- Turns on the bed friction predictor and feedback to Telemac-2d

OPTIONS FOR THE BED ROUGHNESS

IKS = 1 flat bed

IKS = 2 rippled bed

IKS = 3 Van Rijn (2007) predictor for megaripples and dunes

When the bed roughness prediction is set to Yes, Use of Nikuradse KFROT = 5. This is corrected automatically in lecdon_sisyphe.f when sisyphe is uncoupled.

MPM COEFFICIENT : Meyer Peter Mueller coefficient (Default MPM= 8.)

SECONDARY CURRENTS ALPHA COEFFICIENT (Default ALPHA= 1)

MORPHOLOGICAL FACTOR: MOFAC = 1.

SHIELDS PARAMETER → SHIELDS PARAMETERS array, should be specified for each class.

TREATMENT OF FLUXES AT THE BOUNDARIES" (TRAITEMENT DES FLUX AUX FRONTIERES). Integer, default : 1. This applies to suspension.

1 : as before, priority to prescribed value in diffusion (subroutine cvdftr of library BIEF)

2 : priority to prescribed flux

Unlike in 3D but like in Telemac-2D there is a single value for all liquid boundaries. Option 2 takes into account the fact that setting a prescribed value on a boundary triggers an artificial flux that may be unwanted. The real prescribed flux (i.e. prescribed discharge multiplied by prescribed value of tracer) is then guaranteed. This is valid for distributive schemes and finite volume schemes, i.e. options 3, 4, 5, 13, 14.

Changes in French only:

CONCENTRATIONS DE VASE PAR COUCHE becomes : **CONCENTRATIONS DU LIT DE VASE**.

CONTRAINTE CRITIQUE D'EROSION DE LA VASE PAR COUCHE becomes : **CONTRAINTE CRITIQUE D'EROSION DE LA VASE**. It replaces also « VITESSE CRITIQUE D'EROSION DE LA VASE ».

Suppressed key words

- VARIABLE TIME STEP (DTVAR).
- COMPUTATION METHOD (lengthening of the tide …) This is replaced by the MORPHOLOGICAL FACTOR.
- FILTERING COEFFICIENT.
- NON EQUILIBRIUM BED LOAD ('NOEQBED').
- GRAIN FEEDING (LGRAFED).

- CRITICAL EROSION SHEAR VELOCITY OF THE MUD (VITESSE CRITIQUE D'EROSION DE LA VASE). Use instead CRITICAL EROSION SHEAR STRESS OF THE MUD.
- VOLUME CONCENTRATION OF THE COHESIVE BED (CONCENTRATION VOLUMIQUE DU LIT COHESIF).

New numerical schemes

TYPE OF ADVECTION : 3, 4 , 5; 6 ; 7; 13; 14

13 and 14 (Edge based N schemes) are recommended for tidal flats and rigid beds and equivalent to finite volumes.

Attention: **'OPTION FOR THE TREATMENT OF RIGID BEDS'** Should be now set to 0 if the finite element option is chosen; Previous methods 3 and 4 are now obsolete.

Modified subroutines

- Sisyphe
- Bedload_meyer, bedload_seccurrent, init_transport
- Declarations_sisyphe
- Interface_sisyphe
- Lecdon_sisyphe
- Suspension_vanRijn
- Suspension_main
- suspension_computation
- suspension_erosion
- Suspension_flux_mixte
- Init_transport,
- Nomvar.f
- point_sisyphe